AMENDMENTS TO THE CLAIMS

Claims 1-40 are pending. Please amend claims 1, 12, 13, 21, 22, 33, 34 and 40. No claims are canceled or withdrawn. The following listing of claims replaces all prior versions and listings of claims in the application.

1. (Currently amended) A computer-implemented method comprising:

identifying relationships between multi-type data objects, wherein the multi-type data objects comprise at least one object of a first type and at least one object of a second type different from the first type;

iteratively clustering the multi-type data objects in view of respective ones of the relationships to generate reinforced clusters; and

utilizing, by a search term suggestion component, the ~~wherein the~~ reinforced clusters ~~are for use by a search term suggestion component~~ to respond to a search query from a user with terms relevant to the search query.

2. (Previously presented) The method of claim 1, wherein the relationships comprise inter-layer relationships including one or more of content related information, user interest in an associated topic, and user interest in an associated Web page.

3. (Previously presented) The method of claim 1, wherein the relationships comprise intra-layer relationships including one or more of query refinement(s), recommended Web page(s), and relationship(s) between respective users.

4. (Previously presented) The method of claim 1, wherein each of the multi-type data objects are related to one or more of a search query data object type, a selected Web page type, and a user information type.

5. (Previously presented) The method of claim 1, wherein respective ones of the relationships are weighted to indicate importance to associated objects of the multi-type data objects.

6. (Previously presented) The method of claim 1, wherein identifying and iteratively clustering are performed for search term suggestion.

7. (Previously presented) The method of claim 1, wherein iteratively clustering further comprises propagating clustering results of a first iteration to all related data objects of the multi-type east two of the related data objects being of heterogeneous data type, the propagating being used to enhance clustering of respective ones of the multi-type data objects in a second iteration of reinforced clustering operations.

8. (Previously presented) The method of claim 1, wherein iteratively clustering further comprises determining a similarity between individual ones of the multi-type data objects, the similarity being a function of one or more of inter-object and intra-object content similarity and similarities between respective ones of the relationships.

9. (Previously presented) The method of claim 1, wherein iteratively clustering further comprises merging related ones of the multi-type data objects to reduce feature space dimensionality of the related ones.

10. (Previously presented) The method of claim 1, wherein the method further comprises mutually reinforcing an importance of individual ones of the multi-type data objects within an object type and between different object types.

11. (Previously presented) The method of claim 10, wherein mutually reinforcing the importance of individual ones of the multi-type data objects within an object type and between different object types is based on the following:

$$\begin{cases} a(X) = \beta L_X{}^T h(X) + (1-\beta) L_{XY} i(Y) \\ h(X) = \beta L_X a(X) + (1-\beta) L_{XY} i(Y) \\ i(X) = a(X) + h(X) \end{cases}$$

$$\begin{cases} a(Y) = \gamma L_Y{}^T h(Y) + (1-\gamma) L_{YX} i(X) \\ h(Y) = \gamma L_Y a(Y) + (1-\gamma) L_{YX} i(X) \\ i(Y) = a(Y) + h(Y) \end{cases}$$

wherein $X = \{x_1, x_2, \cdots x_m\}$ and $Y = \{y_1, y_2, \cdots y_n\}$ represent respective object sets of heterogeneous object type with relationships R_X, R_Y, R_{XY} and R_{YX} if directionality is considered, L_X and L_Y represent adjacent matrixes of links identifying relationships within set X and Y respectively, L_{XY} and L_{YX} represent adjacent matrixes of links identifying relationships from objects in X to objects in Y, $a(X)$ and $h(X)$ are an *authority* score and *hub* score of nodes within X respectively, $a(Y)$ and $h(Y)$ respectively represent *authority* and *hub* scores of nodes in Y, $i(X)$ and $i(Y)$ respectively represent an *importance* of the nodes in X and Y, and β and γ are weight parameters to adjust influence of links derived from different relationships.

12. (Currently amended) The method of claim 1, wherein utilizing the reinforced clusters further comprises ~~and further comprising~~:

responsive to receiving a term from a user, comparing the term with a feature space of objects in the reinforced clusters;

responsive to comparing, identifying one or more search term suggestions; and

communicating the search term suggestions to the user.

13. (Currently amended) A computing device comprising:

a processor; and

a memory coupled to the processor, the memory comprising computer-program instructions executable by the processor for:

identifying relationships between multi-type data objects, wherein the multi-type data objects comprise at least one object of a first type and at least one object of a second type different from the first type;

iteratively clustering the multi-type data objects in view of respective ones of the relationships to generate reinforced clusters, each relationship of the relationships being weighted to indicate an importance to associated objects of the multi-type data objects; and

utilizing, by a search term suggestion component, the ~~wherein the~~ reinforced clusters ~~are for use by a search term suggestion component~~ to respond to a search query from a user with terms relevant to the search query.

14. (Previously presented) The computing device of claim 13, wherein the relationships comprise inter-layer relationships including one or more of content related information, user interest in an associated topic, and user interest in an associated Web page.

15. (Previously presented) The computing device of claim 13, wherein the relationships comprise intra-layer relationships including one or more of query refinement(s), recommended Web page(s), and relationship(s) between respective users.

16. (Previously presented) The computing device of claim 13, wherein identifying and iteratively clustering are performed for search term suggestion.

17. (Previously presented) The computing device of claim 13, wherein the computer-program instructions for iteratively clustering further comprise instructions for aggregating data object relationships to related ones of the multi-type data objects based on content of the reinforced clusters.

18. (Previously presented) The computing device of claim 13, wherein the instructions for iteratively clustering further comprise instructions for determining a similarity between individual ones of the multi-type data objects, the similarity being a function of one or more of inter-object and intra-object content similarity and similarities between respective ones of the relationships.

19. (Previously presented) The computing device of claim 13, wherein the instructions for iteratively clustering further comprise instructions for merging related ones of the multi-type data objects to reduce feature space dimensionality of the related ones.

20. (Previously presented) The computing device of claim 13, wherein the instructions for iteratively clustering further comprise instructions for iteratively clustering until all object types represented by the multi-type data objects converge.

21. (Currently amended) The computing device of claim 13, wherein utilizing the reinforced clusters further comprises~~and further comprising instructions for~~:

responsive to receiving a term from a user, comparing the term with a feature space of objects in the reinforced clusters;

responsive to comparing, identifying one or more search term suggestions; and

communicating the search term suggestions to the user.

22. (Currently amended) A tangible computer-readable data storage medium comprising computer-executable instructions executable by a processor for:

identifying one or more of intra-layer and inter-layer relationships between multi-type data objects, wherein the multi-type data

objects comprise at least one object of a first type and at least one object of a second type different from the first type;

iteratively clustering the multi-type data objects in view of respective ones of the relationships to generate reinforced clusters; and

utilizing, by a search term suggestion component, the ~~wherein the~~ reinforced clusters ~~are for use by a search term suggestion component~~ to respond to a search query from a user with terms relevant to the search query.

23. (Previously presented) The computer-readable medium of claim 22, wherein the inter-layer relationships comprise one or more of content related information, user interest in an associated topic, and user interest in an associated Web page.

24. (Previously presented) The computer-readable medium of recited in claim 22, wherein the intra-layer relationships comprise at least one of query refinement(s), recommended Web page(s), and relationship(s) between respective users.

25. (Previously presented) The computer-readable medium of claim 22, wherein each of the multi-type data objects are related to at least one of a search query data object type, a selected Web page type, and a user information type.

26. (Previously presented) The computer-readable medium of claim 22, wherein respective ones of the relationships are weighted to indicate an importance to associated objects of the multi-type data objects.

27. (Previously presented) The computer-readable medium of claim 22, wherein identifying and iteratively clustering are performed for search term suggestion.

28. (Previously presented) The computer-readable medium of claim 22, wherein iteratively clustering further comprises propagating clustering results of a first iteration to all related data objects of the multi-type data objects, at least two of the related data objects being of heterogeneous data type, the propagating being used to enhance clustering of respective ones of the multi-type data objects in a second iteration of reinforced clustering operations.

29. (Previously presented) The computer-readable medium of claim 22, wherein iteratively clustering further comprises determining a similarity between individual ones of the multi-type data objects, the similarity being a function of at least one of object content similarity and similarities between respective ones of the relationships.

30. (Previously presented) The computer-readable medium of claim 22, wherein iteratively clustering further comprises merging related ones of the multi-type data objects to reduce feature space dimensionality of the related ones.

31. (Previously presented) The computer-readable medium of claim 22, wherein the instructions further comprise instructions for mutually reinforcing an importance of individual ones of the multi-type data objects within an object type and between different object types.

32. (Previously presented) The computer-readable medium of claim 31, wherein mutually reinforcing the importance of individual ones of the multi-type data objects within an object type and between different object types is based on the following:

$$\begin{cases} a(X) = \beta L_X{}^T h(X) + (1-\beta) L_{XY} i(Y) \\ h(X) = \beta L_X a(X) + (1-\beta) L_{XY} i(Y) \\ i(X) = a(X) + h(X) \\ \\ a(Y) = \gamma L_Y{}^T h(Y) + (1-\gamma) L_{YX} i(X) \\ h(Y) = \gamma L_Y a(Y) + (1-\gamma) L_{YX} i(X) \\ i(Y) = a(Y) + h(Y) \end{cases}$$

wherein $X = \{x_1, x_2, \cdots x_m\}$ and $Y = \{y_1, y_2, \cdots y_n\}$ represent respective object sets of heterogeneous object type with relationships R_X, R_Y, R_{XY} and R_{YX} if directionality is considered, L_X and L_Y represent adjacent matrixes of links identifying relationships within set

X and Y respectively, L_{XY} and L_{YX} represent adjacent matrixes of links identifying relationships from objects in X to objects in Y, $a(X)$ and $h(X)$ are an *authority* score and *hub* score of nodes within X respectively, $a(Y)$ and $h(Y)$ respectively represent *authority* and *hub* scores of nodes in Y, $i(X)$ and $i(Y)$ respectively represent an *importance* of the nodes in X and Y, and β and γ are weight parameters to adjust influence of links derived from different relationships.

33. (Currently amended) The computer-readable medium of claim 22, wherein utilizing the reinforced clusters further comprises ~~and further comprising instructions~~ for:

responsive to receiving a term from a user, comparing the term with a feature space of objects in the reinforced clusters;

responsive to comparing, identifying one or more search term suggestions; and

communicating the search term suggestions to the user.

34. (Currently amended) A computing device comprising:

identifying means to identify relationships between multi-type data objects, wherein the multi-type data objects comprise at least one object of a first type and at least one object of a second type different from the first type;

iterative clustering means to iteratively cluster the multi-type data objects in view of respective ones of the relationships to generate reinforced clusters; and

utilizing means to use the ~~wherein the~~ reinforced clusters ~~are for use by a search term suggestion component~~ to respond to a search query from a user with terms relevant to the search query.

35. (Previously presented) The computing device of claim 34, wherein the computing device further comprises weighting means to weight respective ones of the relationships to indicate an importance to associated objects of the multi-type data objects.

36. (Previously presented) The computing device of claim 34, wherein the computing device further comprises determining means to locate a search term suggestion from the reinforced clusters responsive to receipt of a bid term, the search term suggestion substantially matching or being related to one or more of the multi-type data objects.

37. (Previously presented) The computing device of claim 34, wherein the iterative clustering means further comprise aggregating means to propagate data object relationships to related ones of the multi-type data objects based on content of the reinforced clusters.

38. (Previously presented) The computing device of claim 34, wherein the iterative clustering means further comprise determining means to determine a similarity between individual ones of the multi-type data objects, the similarity being a function of at least one of object content similarity and similarities between respective ones of the relationships.

39. (Previously presented) The computing device of claim 34, wherein the iterative clustering means further comprise merging means to combine related ones of the multi-type data objects to reduce feature space dimensionality of the related ones.

40. (Currently amended) The computing device of claim 34, wherein the utilizing means further comprises ~~and further comprising~~:

comparing means, responsive to receiving a term from a user, to compare the term with a feature space of objects in the reinforced clusters; and

responsive to comparing, identifying means to identify one or more search term suggestions.